THOMAS; Notes on apple rusts, and Notes on the genus Stemonitis, by H. H. WHETZEL; The plant ecology of Winona lake, by LUCY YOUSE. The secretary of the Academy is John S. Wright, Indianapolis, Ind.—J. M. C.

NOTES FOR STUDENTS.

STUDENTS OF STEM ANATOMY will be interested in a recent paper of Solms-Laubach[2] upon the branching of *Isoetes lacustris*. The occurrence of a large number of branching specimens of unusual luxuriance and size, in a lake visited by the author in 1897, led him to a detailed study of the stem and a review of the literature upon the subject.—FLORENCE M. LYON.

TOBLER[3] finds that the thallus of one of the Rhodomelaceae, namely *Dasya elegans*, breaks down into single cells and cell-groups under certain conditions, and that these cells retain their vitality and finally develop new thalli, after the manner of the process which occurs so often in the Conjugatae and Confervoideae. The exact conditions under which this breaking down occurs were not worked out, but the author is sure the active stimulus is not one of increase in concentration of the external solution.

Observation that the ultimate branches of *Bryopsis plumosa* fall off and exhibit a marked power of growth somewhat similar to that just described, and that they sometimes form long siphonaceous tubes much resembling those of Vaucheria, has been made by Wright[4] and recorded in a recent note. —B. E. LIVINGSTON.

TWO FUNGUS DISEASES of the white cedar (*Cupressus thyoides*) are described in a recent paper by Harshberger.[5] These are caused by *Gymnosporangium biseptatum* Ellis, and *G. Ellisii* (Berk.) Farlow, both of which grow in the wood of the cedar. The author discusses the normal structure of the cedar wood, paying special attention to the number of tracheids in the various annual rings, and the conditions which influence their development. The influence of the growth of the fungus mycelia in the stems is evidenced by the formation of swellings, which show a large increase in the number of tracheids and increased activity of the phellogen. In the swellings caused by *G. biseptatum*, many of the tracheids appear to be plugged by a substance which the author calls "fungus gamboge." A detailed description of the structure of the swellings, the mycelia, and a consideration of the relation of the host cells and the hyphae follow.—H. VON SCHRENK.

[2] SOLMS-LAUBACH, H. GRAF ZU, *Isoetes lacustris*, seine Verzweigung und sein Vorkommen in den Seen des Schwarzwaldes und der Vogesen. Bot. Zeit. **60**: 179–206. *pl.* 7. 1902.

[3] TOBLER, F., Zerfall und Reproductionsvermögen des Thallus einer Rhodomelacee. Ber. Deutsch. Bot. Gesell. **20**: 357–365. 1902.

[4] WRIGHT, E. P., Note on *Bryopsis plumosa*. Notes from Bot. School Trin. Coll. Dublin. **1**: 174–175. 1902.

[5] HARSHBERGER, JOHN W., Two fungus diseases of the white cedar. Proc. Acad. Nat. Sci. Philadelphia, 1902: 461.

A NEW SUGGESTION as to the nature and origin of protoplasm has been made by Herrera.[6] By triturating the acetate, carbonate, or chlorid of calcium with glacial phosphoric acid, and then treating the resulting substance with salt solutions, the author obtains a mass which behaves under the microscope very much as does protoplasm. It shows amoeboid motion, a vacuolar or granular structure, plasmolyzes in certain cases when treated with plasmolyzing solutions, can be stained with methyl green, has its movements accelerated by sodium chlorid, etc. Herrera ventures the tentative hypothesis that "natural protoplasm is an inorganic metaphosphate impregnated by various substances absorbed or secreted under special osmotic and electric conditions." From the standpoint of such an hypothesis the theoretical explanation of the first appearance of the living substance upon the earth might not be such a difficult problem as it has heretofore seemed.—B. E. LIVINGSTON.

IN A PRELIMINARY NOTE Kuckuck[7] describes the phenomenon of zoospore production in *Valonia ovalis.* Parts of the protoplasm contained in the one-celled, bulbous thallus divide into zoospores, which escape through several openings produced by an apparent local absorption of the cell wall. After the escape of the zoospores these openings close and the remaining protoplasm occupies the entire cell, which resumes its normal vegetative appearance and continues the normal life processes. This is a case where during a very active period the protoplasm exists perfectly free from the conditions of turgor, so important at all times in most plant organisms; during the escape of the zoospores the large vacuole of the cell is in direct connection with the external solution through the several openings. Another curious fact is that the reproductive portion of the plasma is not separated by a wall from the vegetative part. In this respect Valonia differs from the other forms of the Siphoneae which have been studied; in them either the whole cell takes part in zoospore production and thus ends its career (Botrydium), or the portion so taking part is cut off from the rest by a wall formed previous to the actual division into zoospores (Codium, Bryopsis, Vaucheria).—B. E. LIVINGSTON.

IN A CONTINUATION of his studies on the lichens, Baur[8] makes valuable additions to our knowledge of the development of the apothecia in a number of genera, and a résumé is given of the evidence for the sexuality of the lichens. The ascogons and trichogynes of Parmelia and Pertusaria are specially described and figured. Particularly interesting are Baur's observa-

[6] HERRERA, A. L., Le protoplasma de métaphosphate de chaux. Mem. Rev. Soc. Sci. "Antonio Alzate," Mexico **17**:201–213. 1902.

[7] KUCKUCK, P., Zur Fortpflanzung von *Valonia* Gin. Ber. Deutsch. Bot. Gesell. **20**:355–357. 1902.

[8] BAUR, E., Die Anlage und Entwickelung einiger Flechtenapothecien. Flora. **88**:319–332. *pls. 14–15.* 1901.

tions on *Pertusaria communis*. Krabbe who studied the same lichen states that he found no trace of sexual organs or of a differentiation of ascogons and paraphyses. Baur's sections show the characteristic thick, coiled ascogons and trichogynes and the later developed ascogenous hyphae most sharply differentiated from the surrounding vegetative tissue from which arise the paraphyses. Of special interest in this lichen is the capacity for indefinite development shown by the ascogenous hyphae. Growing and branching richly at their tips and dying off at their basal ends as they advance, they spread through the thallus and form apothecia at various points, even 2^{mm} distant from the original trichogyne and ascogon from which they arose. Such extended independent growth of the ascogenous hyphae forms a good parallel to what Watnio has already claimed for Cladonia. Baur also describes the development of the pyrenolichen *Pyrenula nitida*, and finds here also the characteristic differentiation of ascogon and trichogyne. The recent work of Baur and others has made the morphology of the ascocarp for the entire family of the lichens better known than it is in any other similar series of Discomycetes.—R. A. HARPER.

SINCE THE APPEARANCE of Czapek's answer to Wachtel's paper on the method of bent tubes to demonstrate the sensitiveness of root-tips to the gravity stimulus, we have had a desire for some entirely different method by which this long-discussed question could be attacked anew. Czapek's position seemed to be established, but the lack of confirmatory evidence from other sources has been still noticeable. In a recent paper by Francis Darwin[9] a new method of approach is described. It is a modification of that used by him[10] in showing that the cotyledon of Setaria, Sorghum, etc., is the perceptive region in geotropic curvature of the hypocotyl. Since the root tip is slimy and the whole organ mechanically weak, it is impossible to fix the tip in a horizontal tube and have it support the weight of the rest of the seedling. The new method obviates this difficulty by affixing the cotyledons to the end of a long lever free to move in both a vertical and horizontal plane. The lever is of course counterbalaned, and thus the cotyledons (of beans in this case) are able to move freely in any direction in a spherical plane, whose radius of curvature is the length of the supporting lever-arm. When the cotyledons are so supported the root-tip is placed in a horizontal tube (of straw, dandelion scape, etc.), and complete turns are executed by the curving root. The method is difficult of operation, and a large number of experiments failed because the root-tip slipped from the tubes. But the author believes he has demonstrated in this way that as long as the tip is horizontal the response of the growing region produces a continuous curve resulting in

[9] DARWIN, F., On a method of investigating the gravitational sensitiveness of root-tip. Jour. Linn. Soc. **35**:266–274. *figs. 1–10*. 1902.

[10] DARWIN, F., On geotropism and the localization of the sensitive region. Ann. Bot. **13**:567–574. *pl. 29*. 1899.

a spiral like those produced by similar treatment in the hypocotyls of grass seedlings.—B. E. LIVINGSTON.

THE ALMOST HOPELESSLY complex chemical changes which are constantly taking place during the life of the organism are gradually beginning to yield to modern methods of experimentation. Recently two papers have appeared on the transformations occurring in phosphorus compounds during germination, one by Iwanow[11], the other by Zaleski[12].

The former used seedlings of *Vicia sativa* grown in phosphorus-free Knop's solution, and determined the amounts of the various phosphorus compounds at the beginning of the cultures and after 5, 10, 15, 20, and 29 days. Determination was made (1) of total phosphorus content, (2) of inorganic phosphorus, (3) of the phosphorus or lecethin, (4) of the phosphorus of proteid compounds, and (5) of that of soluble organic compounds. Zaleski used seedlings of *Lupinus angustifolius*, grown in phosphorus-free sand, and determined the phosphorus (in the same categories of compounds as those determined by Iwanow) at the beginning of the cultures and after 10, 15, and 25 days. Both authors find that during germination inorganic phosphates increase at the expense of organic phosphorus compounds. Iwanow presents evidence that most of this phosphorus comes from the breaking down of phosphorus-containing proteids; some is from the soluble organic bodies bearing phosphorus, and a very little arises from the decomposition of lecethin. Zaleski determined that the decrease in organic phosphorus is mainly in the cotyledons, while the most marked increase in inorganic phosphorus is in the axial organs. He shows also that young and vigorous tips of seedlings of *Vicia faba*, placed in glucose solution, exhibit a less marked decrease in organic phosphorus compounds, as well as less rapid growth, than when these are placed in water. He concludes that the sugar retards both growth and the process of phosphorus-transformation, and that therefore it is possible to suppose a direct relation to exist between the breaking down of organic phosphorus-containing bodies and growth itself.—B. E. LIVINGSTON.

BURKILL[13] has investigated the variation in the floral organs of *Ranunculus arvensis*. From a study of about 7,000 flowers, from seed obtained at Kew, England, and at Bonn and Heidelberg, Germany, he reaches essentially the following conclusions: Each set of floral organs varies according to a law of its own, and none of the curves agrees perfectly with any theoretical probability curve. Although the different whorls respond differently to conditions of favorable or unfavorable nutrition, there is always an apportionment

[11] IWANOW, L., Ueber die Umwandlungen des Phosphors beim Keimen der Wicke. Ber. Deutsch. Bot. Gesell. **20**: 366–372. 1902.

[12] ZALESKI, W., Beiträge zur Verwandlung des Eiweiss phosphors in den Pflanzen. Ber Deutsch. Bot. Gesell. **20**: 426–433. 1902.

[13] BURKILL, I. H., On the variation of the flower of *Ranunculus arvensis*. Jour. Asiatic Soc. Bengal **71**:93–120. 1902.

of the available nutrition to the four sets of organs, no set ever being omitted because of the low vitality. If one set of organs is abmodal, all the other sets are likely to be abmodal, but especially the sets which follow. There is a gradual loss of vigor from beginning to end of the flowering period, though a slight recovery just before death was occasionally observed. Of all the floral organs the stamens are most influenced numerically by the relative vigor of the branch, the number being proportionately greater or less according as the whole number of floral parts is above or below the mode. As a result of this greater sensitiveness of the androecium, the flowers are relatively more staminate at the beginning of the flowering season than at any time thereafter. The degrees of constancy in the several sets of organs, beginning with the highest, are in the order: sepals, petals, carpels, stamens. A parallel is drawn between this condition and the relation of these parts to the natural classification, in which it is pointed out that sepals tend to be constant in number through the larger subdivisions of the Spermatophytes, petals in lesser divisions, carpels in the families, and that stamens are so inconstant as to be of little use numerically in a natural classification. The paper is a valuable contribution to our knowledge of floral variation, but the discussions of the problem and the interpretation of the results are rendered vague, and at times incomprehensible, by a diction which constantly suggests the possession of psychic attributes by the various organs or sets of organs.—G. H. SHULL.

ITEMS OF TAXONOMIC INTEREST are as follows: ARTHUR HOLLICK (Torreya **2**: 145–148. *pls. 3–4.* 1902) has described a new species of fossil ferns from the Laramie group of Colorado in Anemia (2), Acrostichum, Polystichum, Gleichenia, and Stenopteris.—T. D. A. COCKERELL (*idem* 154) has described a new Astragalus from New Mexico.—C. V. PIPER (Bull. Torr. Bot. Club **29**: 535–549. 1902), in discussing the biennial and perennial west American species of Lappula, has described 9 new species.—V. S. WHITE (*idem* 550–563), in giving a preliminary list of fungi from Bar Harbor, Mount Desert, Maine, has published new species of Hydnum (2) by H. J. BANKER, and of Boletus, Clitocybe, Cortinarius, and Flammula by C. H. PECK.—J. S. COTTON (*idem* 573–574) has described new species of Glyceria, Astragalus, and Orthocarpus from Washington.—G. F. ATKINSON (Jour. Mycol. **8**: 106–107. 1902) has described two new genera of Basidiomycetes under the names *Tremellodendron* (Tremellineae) and *Eocronartium* (Auriculariaceae), and also (*idem* 110–119) 23 new species distributed among 16 genera.—G. P. CLINTON (*idem* 128–156) has published in preliminary form the results of his studies of North American Ustilagineae, presenting a list of the species with their hosts and distribution, and including descriptions of new species.—H. CHRIST (Bull. Acad. Internat. Geog. Bot. **11**: 189–274. 1902), in giving an account of the Chinese ferns collected by Père Bodinier, under the title *Filices Bodinierianae*, has described new species of Antrophytum, Polypo-

dium (4), Niphobolus, Adiantum, Doryopteris, Blechnum, Asplenium (3), Aspidium (4), Polystichum (5), and Gleichenia; the same author (Bull. Herb. Boiss. II. **2**: 825–832. 1902), in reporting concerning the collection of Père Faurie (*Filices Faurieanae*) from Korea, has described new species of Athyrium (2) and Aspidium.—C. L. POLLARD (Proc. Biol. Soc. Washington **15**: 201–203. 1902) has described two new violets from the eastern United States.—MARCUS E. JONES (Contr. to Western Bot. no. 10) has published a revision of Allium as represented in the Great Basin and adjoining regions, including 3 new species; has presented the Nyctaginaceae of the Great Plateau, including new species of Boerhaavia (2) and Acleisanthes; has described new species of Leptotaenia and Gilia; and has revised the nomenclature of a number of species of Astragalus, including descriptions of 4 new species.—B. FEDTSCHENKO (Acta Hort. Petrop. **19**: 183–349. 1902) has published a detailed revision of Hedysarum, recognizing 78 species, of which 3 are new.—J. M. C.

IN THE PRESENT PAPER Neger[14] has extended the ecological studies begun on Phyllactinia to the whole family of the Erysipheae. Very interesting data are given as to the methods of attachment, as also the setting free and distribution of the perithecia, and the scattered observations of a number of authors are brought together and summarized. The perithecia of Sphaerotheca and Erysiphe are not spontaneously set free from the substratum, and the appendages here serve for attachment. On the other hand, the perithecia of Podosphaera, Trichocladia, Microsphaera, and some Uncinulas are broken loose as a result of unequal shrinkage of the upper and under walls of the perithecia in drying. This makes the ripe and dry perithecium either flat or concave on its under side, as has also been observed by Galloway. Just how this deformation leads to the setting free of the perithecia is perhaps still not clear. The interlacing of the appendages serves to hold adjacent perithecia together so that they fall from the host leaf in masses rather than singly. In Phyllactinia the perithecia are set free by the bending downwards of the spine-like appendages which thus lift up the perithecium from the surface of the leaf. The author also discusses the question as to the causes which lead to the formation of the sexual and asexual fruit organs, and concludes that the conidia are favored by a fresh vigorous condition of the host plant, while the perithecia are more likely to be formed in well developed mycelia on mature parts of the host, which, however, must not have been already exhausted by a too abundant crop of conidia.

The earlier paper[15] describes very extensive germination experiments and studies on the form, length, irritability, etc., of the germ tubes of the

[14] NEGER, F. W., Beiträge zur Biologie der Erysipheen. Flora **88**: 333–370. *pls. 16–17.* 1901.

[15] NEGER, F. W., Zur Kenntniss der Gattung Phyllactinia. Ber. Deutsch. Bot. Gesell. **17**: 235. 1899.

conidia. The author believes that in such genera as Erysiphe the characters of the germ tubes may be advantageously used in defining the limits of difficult species. In every case the germ tubes showed themselves incapable of nourishing themselves from any nutrient media offered. Their size was limited strictly by the amount of reserve material present in the spore. Different lots of conidia also varied widely in the percentage of germination. Light favors germination and the germ tubes are in many cases positively heliotropic. In many cases also the germ tubes show themselves sensitive to contact stimuli. A considerable series of infection experiments were made, and although the evidence was by no means conclusive many results indicated that in the mildews, as in the rusts, we have numerous cases of physiological species, inhabiting only one host plant, within the limits of the species as at present commonly accepted. Cases are also pointed out in which it seems likely that the ascospores may be capable of infecting a wider series of hosts than can the conidia. The theoretical aspects of the data so obtained are discussed at some length. A further interesting observation of the author is that the little known conidia of Phyllactinia are borne in the ordinary basipetal series and not singly as described by Tulasne. Of theoretical interest further is the suggestion that the development of hyphae and haustoria, which penetrate to the interior of the host leaf, as described by Palla and Smith, is correlated with the degree of hypertrophy produced by haustoria in the epidermal cells of the host. The haustoria restrict themselves to the epidermis in cases like Sphaerotheca, in which the cells of the latter are hypertrophied, and thus (?) produce an abundant food supply for the parasite.—R. A. HARPER.

RECENT CONTRIBUTIONS TO AMERICAN PHYTOGEOGRAPHY: the Eastern United States.—E. F. WILLIAMS (Rhodora 3: 160–165. 1901) makes a comparison of Mounts Washington and Ktaadn, finding general similarity. Mount Ktaadn, however, has a more rugged and arctic aspect, the timber line being exceedingly low; an interesting colony of lowland plants was found well up toward the summit.—J. W. HARSHBERGER (Plant World 5: 21–28. 1902) gives a brief ecological account of Mount Ktaadn, in which the lowland timber areas are also described.—C. D. HOWE (Science 15: 462. 1902) gives a preliminary account of his studies on a delta plain in Vermont; the development of the vegetation is traced from the beach, through the *Pinus rigida* stage, to the culminating forest of beech and maple. The life history in Vermont is found to be essentially like that in Michigan, as worked out by Cowles and Whitford.—C. H. SHAW (BOT. GAZ. 33: 437–450. 1902) discusses very suggestively the development of vegetation in morainal depressions near Woods Hole. Physical agents are found to control the filling of ponds in some cases, as evidenced by open marginal belts of water. *Euthamia graminifolia* flourishes on sandy shores by reason of its running stems; beyond this there are no plants until the depositing zone is passed, where Limnanthemum and other runnerless plants occur. Marginal ditches

about floating mats are explained by the great abundance of falling leaves, which smothers out the vegetation. The vegetation is not xerophytic in structure in the earlier stages.—A. HOLLICK (Bull. N. Y. Bot. Gard. **2** : 381–407. 1902 ; see also Torreya **2** : 58–59. 1902), in a paper dealing chiefly with geological phenomena, gives a short account of the vegetation of Cape Cod. Apparently the dunes of Provincetown were once well forested, while it is now difficult to secure artificial reforestration. To account for this Hollick advances the view that a forest can develop *pari passu* with the increasing piles of sand ; if, however, the trees are cut off, the drifting sand makes reforestration difficult or impossible. The vegetation is treated in two groups, that of the forest (dominated by *Pinus rigida*, *Quercus rubra*, and *Q. velutina*), and that of the bare sands, subdivided into beach and dunes. Reference has previously been made (BOT. GAZ. **31** : 134. 1901) to the excellent work of HOLLICK on the forests of New Jersey.—J. W. HARSHBERGER (Proc. Acad. Nat. Sci. Philadelphia 1900 : 623–671) has made an ecological study of the New Jersey strand flora. He finds a plantless lower beach, a middle beach with Cakile and other succulents, and an upper beach with much *Oenothera humifusa*, a plant of southern range. The seaward dunes are dominated by Ammophila, while farther inland *Myrica cerifera* and Hudsonia assume the leading place. The tree-clad strand is dominated by weather-beaten junipers, and there is also a jungle zone of trees, shrubs, and lianas. The salt marshes are also considered.—C. F. SAUNDERS (*idem* 544-549) describes the pine barrens and sphagnous bogs of New Jersey.—A. MACELWEE (*idem* 482–490) considers the flora of Edgehill ridge, Montgomery county, Pa., three societies being discussed, namely, sunshine, shade, and sphagnous bog.

T. H. KEARNEY (Contrib. U. S. Nat. Herb. **5**: 261–319. 1900) has published a short but interesting account of the vegetation of Ocracoke island, North Carolina. While many forms are common to northern beaches and dunes, such plants as *Croton maritimus* dominate on the beach, and *Uniola paniculata* on the outer dunes. Live oaks rule in the groves, and *Ilex vomitoria* in the thickets. The salt marshes have many familiar northern types. The mingling of salt and fresh water forms is explained by alternations of salty spray and rainfall ; perhaps, however, fresh conditions are encroaching upon the salt, leaving the salt marsh forms as relicts. Interesting anatomical studies upon salt marsh plants confirm the prevalent notion of their xerophytic structure. The island is placed in Merriam's Austroriparian, though many typical plants are absent and others present.—D. S. JOHNSON (BOT. GAZ. **30** : 405–410. 1900) gives some ecological notes on the seed plants and algae at Beaufort, N. C.

T. H. KEARNEY (Contrib. U. S. Nat. Herb. **5** : 321–585. 1901) gives a most excellent account of the vegetation of the Dismal Swamp region. The paper is splendidly illustrated with plates and numerous figures, and is one of the most valuable of recent contributions to plant geography. He regards the region as belonging to Schimper's ever-moist warm temperate zone, though differing

from most similar regions in that deciduous trees dominate instead of evergreens. The salt marshes with Spartina, Salicornia, and other characteristic plants pass gradually into Typha swamps. Among the noteworthy "adaptations" are sheaths which prevent the access of salt water, anchoring rhizomes, and a number of well-known xerophytic structures. The beach flora is sparse, and resembles the more northern beaches. Dunes are well developed and are in some cases eighty feet high; Ammophila is the character plant of the outer dunes, but the more southern *Uniola* also has a place. The occurrence of *Salix longifolia*, Cephalanthus, and Baccharis on the dunes is cited as an evidence of the sand moisture; perhaps they also indicate the advance of a dune over a swamp. The occurrence of *Acer rubrum* and *Nyssa sylvatica* on the lee dune slopes may have a similar explanation, as is the case on Cape Cod. The abundance of *Pinus Taeda* with live oaks on the forested dunes gives a southern aspect, though many of the character plants remain such far to the northward; lianas are highly developed. The usual xerophytic "adaptations" are noted, though neither the soil nor air is dry. The character of the drainage is the chief factor which determines the nature of the inland vegetation. *Pinus Taeda* is the leading forest tree, though it is readily followed by hardwoods in most places if removed. Abandoned fields are first colonized by *Andropogon virginicus*, and later by pines. The leading deciduous tree is Liquidambar, although oaks are abundant; Fagus occurs in rich soil. The swamps are of two types: (1) the dark or black gum swamp, which contains *Acer rubrum* and Taxodium as well; (2) the light or "Juniper" swamp, in which Chamaecyparis rules, and in which there is less water, though what occurs is more acid. This region is the northeastern terminus of Merriam's Austroriparian; many southern and a few northern plants reach here their limits. The analysis of many important topics is keen, and the paper is a highly welcome addition to ecological literature.

C. C. ADAMS (Biol. Bull. 3:115–131. 1902) in a most valuable paper discusses the southeastern United States as a center of distribution. His data are derived in the main from zoological material, but his conclusions are of general interest. Among the criteria for determining a distribution center, aside from fossil evidence, he gives the location of greatest differentiation, of dominance or abundance, of maximum size, of productiveness, of continuity and convergence of lines of dispersal, of least dependence upon a restricted habitat, of continuity and directness of variation along radiating lines of dispersal. Using these and other criteria Adams shows the southeastern United States to be a great center of dispersal, at least for animals. The chief highways have been the Atlantic coast, the Mississippi valley, the Appalachian mountains. He makes a just plea for the dendritic as against the zonal study of life; lines of dispersal and divergence give a clue to many of the great biological problems. This type of study is dynamic and genetic, and thus has a great advantage over the more common methods.— Reference has been previously made to the work of KEARNEY in the Appalachian

region (BOT. GAZ. **31**:208. 1901), also to GATTINGER'S Tennessee flora (BOT. GAZ. **32**:428. 1901), in which the various regions of the state are described as to their vegetation.

R. M. HARPER (Bull. Torr. Bot. Club **27**:320–341; 413–436. 1900) has given some interesting data concerning the flora of Georgia. Northern and southern Georgia are quite different, the former having a flora like that farther north, while southern Georgia has true southern types. Lists are given of many plant communities. More recently (Science **16**:68–70. 1902) the same author has written a brief account of the botanical features of the Lafayette and Columbia formations. He finds that it is possible to distinguish these formations by the plants which grow upon them. *Eriogonum tomentosum* and *Froelichia Floridana* especially characterize the Columbia sands. Harper (Bull. Torr. Bot. Club **29**:383–399. 1902) has also published a paper which deals with the distribution of Taxodium. He thinks that there are two species, *T. distichum* and *T. imbricarium*, and that the latter always occur on Lafayette soil, the former never. It seems to the reviewer that *T. imbricarium* will prove to be merely an ecological variety, similar to varieties of ferns and violets which Sadebeck years ago experimentally transformed to the parent species.

C. L. POLLARD (*Plant World* 5:8–10. 1902) notes how the mangroves and other species assist in the formation of the Florida keys, commencing where the corals leave off. Rhizophora is the pioneer, but is soon followed by Laguncularia and Conocarpus. When the mangroves die out, we have the "hammock" land.—CHAS. MOHR'S flora of Alabama has been reviewed in these pages (BOT. GAZ. **32**:371. 1901). This work is one of the most complete and satisfactory that has yet appeared in this country, being nothing less than a mine of floristic and ecological information. He notes that in Alabama Merriam's life zones correspond with the geological formations rather than with the climate. The hemlock and sweet birch occur far from their main range, and are relicts of the glacial invasion. A number of interesting endemic and local forms are noted.—LLOYD and TRACY (Bull. Torr. Bot. Club **28**:61–101. 1901) have made an ecological study of the insular flora of Mississippi and Louisiana. This paper is a noteworthy addition, especially as it gives us a means of comparing our northern and southern coasts. The islands are deposits of Mississippi river detritus; in some cases the mud is still the surface material, in other cases it is covered by sand. On the beach northern forms like Salsola and Strophostyles are mingled with the more tropical Ipomoea. Dunes are formed by *Panicum amarum* and Uniola. The palm Serenoa, and other plants form "pedestal" dunes. Sand plains are described of various types, culminating in a forest of pines and live oaks with an undergrowth of palms. A unique set of vegetation conditions is found on the shell strand. Among the leading salt marsh plants are Batis, Avicennia, and Salicornia.

A. J. PIETERS (U. S. Fish Commission Bull. 1901: 57–79) contributes an

important paper on the plants of western Lake Erie. The groups of water and swamp plants are presented. The usual hydrophytic "adaptations" are found, and a number of anatomical figures are given. Some excellent plates, showing the life forms of character species, especially Chara, accompany the article.— H. W. CLARK (Proc. Ind. Acad. Sci. 1901 : 128–192. 1902) gives a list of plants with ecological notes from Eagle (or Winona) lake, Indiana, and vicinity.— MISS LUCY YOUSE (*idem* 192–204) discusses the plant ecology of Winona lake. She treats the dynamics of the vegetation, sketching the changes from the lake and swamp stages to the forest or prairie, and from the bare morainic hills to the forest of beech and maple.—W. M. MILLS (Chicago: The Quadrangle Press. 1902) has also studied the above lake, mainly from the standpoint of physiography, but adds some ecological notes. — M. T. COOK (Proc. Ind. Acad. Sci. 1901 : 266–272. 1902) sketches the development of vegetation in abandoned rock quarries at Greencastle, Indiana.—E. J. HILL (Bull. Torr. Bot. Club **29** : 564–570. 1902) gives some notes on recent adventives in the Chicago flora.—F. E. McDONALD (Plant World 3 : 101–103. 1900) describes a sand dune flora in central Illinois, along the Illinois river. Dunes of pure sand, some a hundred feet high, are formed. *Quercus Marylandica* is the leading tree. As might be expected, many species are common to the Lake Michigan dunes.— H. C. COWLES' paper on the physiographic ecology of Chicago and vicinity appeared in this journal (BOT. GAZ. **31**: 73–108, 145–182. 1901), as well as H. N. WHITFORD'S paper (*idem* 289–325) on the genetic development of the forests of northern Michigan, and E. J. HILL'S paper (*idem* **29**: 419–436. 1900) on the flora of the White Lake region, Michigan.— C. A. DAVIS (Jour. Geol. 9 : 491–506. 1901) has confirmed his previous view on the origin of Michigan marl (see BOT. GAZ. **31** : 361. 1901), and adds some new results.—EMMA J. COLE'S catalogue of the Grand Rapids (Michigan) flora has been noticed (BOT. GAZ. **31** : 437. 1901); a number of southern trees, such as Asimina, Cercis, Carya, Morus, Nyssa, Gymnocladus, Liriodendron, *Cornus florida*, probably find here their northern limit.—V. M. SPALDING (Science **15** : 402. 1902) has projected a survey of the Huron valley, Michigan. The influence of artificial changes on certain plastic forms has been very great.— H. S. REED (BOT. GAZ. **34** : 125–139. 1902) has contributed the first paper to the above survey. His topic is the ecology of a glacial lake, and the paper is particularly valuable because of its dynamic treatment and careful quantitative work.— H. C. COWLES' paper dealing with the influence of underlying rock upon the vegetation has been reviewed previously (BOT. GAZ. **33** : 316. 1902)— B. E. LIVINGSTON (Report Mich. Geol. Surv. 1901 : 79–103. 1902) has published on the distribution of the plant societies in Kent co., Michigan. His results will soon be published in this journal, and it may be merely noted here that his physiographic results agree with those of the reviewer. He strongly urges the moisture-retaining power of the soil as the decisive factor in plant distribution.— E. BRUNCKEN'S valuable studies in Wisconsin have been noted (BOT. GAZ. **34** : 149. 1902). —H. C. COWLES.